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28756 S/056/61/041/003/009/020
B125/B102

Theory of spin-lattice relaxation...

terms in the series expansion of the spin energy, which are linear with respect to $Q_j$. The terms in the expansion of $\mathcal{H}^{(2)}$, which are quadratic with respect to $Q_j$, excite a more efficient relaxation. Independently of the present authors, I. V. Aleksandrov and G. M. Zhidomirov arrived at the same conclusion (ZhETF, 41, 127, 1961). The relaxation-transition probability between sublevels of the spin energy is calculated from the perturbation-theoretical formula

$$w_{M,M'} = \hbar^{-2} \sum_{i,j} \overline{|\langle M|P_{ij}(S)|M'\rangle Q_i Q_j|^2} \varrho_{ij}(\omega_{M,M'}) \qquad (2),$$

where $\varrho_{ij}(\omega_{M,M'})$ is the spectral density of the perturbation energy $\mathcal{H}^{(2)}$ at the transition frequency $\omega_{M,M'}$. The bar denotes the average over the arguments of $\mathcal{H}^{(2)}_{M,M'}$. The densities $\varrho_{ij}(\omega)$ and $\varrho_{jj}(\omega)$ occurring in (2) are given by the expressions

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$$\rho_{ll}(\omega)=\frac{1}{2}\,\frac{\lambda_l+\lambda_l+\tau_r^{-1}}{(\omega_l+\omega_l-\omega)^2+(\lambda_l+\lambda_l+\tau_r^{-1})^2}+\frac{1}{2}\,\frac{\lambda_l+\lambda_l+\tau_r^{-1}}{(\omega_l+\omega_l+\omega)^2+(\lambda_l+\lambda_l+\tau_r^{-1})^2}+$$

$$+\frac{1}{2}\,\frac{\lambda_l+\lambda_l+\tau_r^{-1}}{(\omega_l-\omega_l-\omega)^2+(\lambda_l+\lambda_l+\tau_r^{-1})^2}+\frac{1}{2}\,\frac{\lambda_l+\lambda_l+\tau_r^{-1}}{(\omega_l-\omega_l+\omega)^2+(\lambda_l+\lambda_l+\tau_r^{-1})^2},\quad(5)$$

$$\rho_{ll}(\omega)=\frac{2}{3}\,\frac{\tau_r^{-1}}{\tau_r^{-2}+\omega^2}+\frac{2}{3}\,\frac{2\lambda_l+\tau_r^{-1}}{\omega^2+(2\lambda_l+\tau_r^{-1})^2}+$$

$$+\frac{2\lambda_l+\tau_r^{-1}}{(2\lambda_l+\tau_r^{-1})^2+(2\omega_l+\omega)^2}+\frac{2\lambda_l+\tau_r^{-1}}{(2\lambda_l+\tau_r^{-1})^2+(2\omega_l+\omega)^2}$$

The parameters $\lambda_j$ occurring in (5) indicate the dissipation probabilities of the vibration energy of the complex. For $\omega_j\tau_c \gg 1$ one obtains $\lambda_j \sim \tau_c^{-1}$ and $\lambda_j \sim 10^{12}$ sec$^{-1}$. The frequencies $\omega_j$ amount to $\sim 10^2$ cm$^{-1}$ from which it follows for $\omega_{M,M'} \ll \lambda_j$ that $\rho_{jj}(\omega) \approx 10^{-11}$ sec and $\rho_{ij}(\omega) \approx 10^{-13}$ sec. If the coordinates $Q_i$ and $Q_j$ are degenerate $(\omega_i = \omega_j)$, one finds $\rho_{ij} = \rho_{jj}$. Relaxation in aqueous solutions of $Cr^{3+}$ salts: The $^4F$ term of the free $Cr^{3+}$

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ion in the cubic field produced by the six particles $X_i$ is split up in such a way that the lower orbital level is single. The distance between the remaining orbital levels and the lower level is $\sim 10^{-4}$ cm$^{-1}$. The matrix element of the perturbation $\mathcal{H}^{(2)} + \lambda LS$, which connects the two spin levels M and M', occurs in third approximation. For the probability of the transition M, M+2 one obtains

$$w_{M,M+2} = (S_z^2)^2_{M,M+2}\hbar^{-2}\{e_1[\tfrac{8}{5}(\overline{Q_2^4}\rho_{22} + \overline{Q_3^4}\rho_{33}) + \tfrac{48}{5}\overline{Q_2^2}\,\overline{Q_3^2}\rho_{23} + \tfrac{781}{160}\overline{Q_2^4}\,\rho_{22} + \tfrac{19}{5}(\tfrac{33}{40})^2(\overline{Q_5^4}\rho_{55} + \overline{Q_6^4}\rho_{66})] + \tfrac{16}{5}e_2^2[\overline{Q_4^2}\,\overline{Q_5^2}\rho_{45} + \overline{Q_5^2}\,\overline{Q_6^2}\rho_{56} + \overline{Q_4^2}\,\overline{Q_6^2}\rho_{46}]\}. \quad (12)$$

$$\overline{Q_j^2} = \frac{\hbar}{2\omega_j\mu_j}\operatorname{cth}\frac{\hbar\omega_j}{2kT}, \qquad \overline{Q_j^4} = \frac{3}{4}\frac{\hbar^2}{\omega_j^2\mu_j^2}\operatorname{cth}^2\frac{\hbar\omega_j}{2kT}. \quad (13)$$

where

$$\overline{|(S_{z'}^2)_{M,M'}|^2} = \tfrac{2}{15}(S_xS_z)^2_{M,M+1}; \quad \tfrac{4}{15}(S_z^2)^2_{M,M+2},$$
$$\overline{|(S_{x'}^2 - S_{y'}^2)_{M,M'}|^2} = \tfrac{3}{15}(S_xS_z)^2_{M,M+1}; \quad \tfrac{16}{15}(S_z^2)^2_{M,M+2}, \quad (11)$$
$$\overline{|\{S_{\mu'}S_{\nu'}\}|^2} = \tfrac{7}{15}(S_xS_z)^2_{M,M+1}; \quad \tfrac{16}{15}(S_z^2)^2_{M,M+2}.$$



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The braces denote the symmetric product $\{ab\} = ab + ba$. Similarly, one obtains the probability of the transitions M, M+1, which are of the same order of magnitude. $\varrho_{ij} \approx \varrho_{jj} \approx 10^{-11}$ sec is valid in (12). With $\overline{Q^4} = 1.5 \cdot 10^{-37}$ cm$^4$ the authors found the values $\varepsilon_1 = 1$, $\varepsilon_2 = 0.1$, and $w_{M,M+2} \approx 5 \cdot 10^7$ sec$^{-1}$, which is one order of magnitude smaller than the experimental value ($\sim 5 \cdot 10^8$ sec$^{-1}$). Eq. (12) gives a sufficient description of the temperature dependence of the resonance line width of $Cr^{3+}$ ions in an aqueous solution of $Cr(NO_3)_3$, where $\Delta H_{exp}$ at 303, 323, 373, 423, and 473°K is 245, 190, 125, 107, and 105 oe, respectively. The authors found $\Delta H_{theor}$ 200, 137, 106, and 89 oe for 323, 373, 423, and 473°K at $w_j = 560$ cm$^{-1}$ and $E/k = 1250$°K. In the case of an anisotropic g factor or Stark splitting of the ion sublevel ($S > 1/2$), another relaxation mechanism is possible, which leads to $T_1^{-1} \sim \mathrm{cth}^2 (\hbar\omega_j/2kT)\tau_r/(1+\omega^2_{M,M'}\tau_r^2)$. The resonance-line width of $Cu^{2+}$ ions in aqueous solution: The orbital

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levels are described by the wave functions $\psi_a = (\psi_2 + \psi_{-2})/\sqrt{2}$, $\psi_b = \psi_0$, $\psi_c = (\psi_2 - \psi_{-2})/\sqrt{2}$, $\psi_d = (\psi_1 + \psi_{-1})/\sqrt{2}$, $\psi_e = (\psi_1 \div \psi_{-1})/\sqrt{2}$. $\Delta \sim 10^4$ and $\delta \sim 10^3 \text{cm}^{-1}$. The width of the resonance line observed during the transitions $a, M = -1/2 \rightarrow a, M = +1/2$ is due to relaxation transitions between the orbital sublevels a and b which are excited under the action of $\mathcal{H}^{(2)}$ alone (without participation of the interaction $\lambda\vec{L}\vec{S}$). The direct transitions $a \rightarrow b$ are much more probable than transitions with spin re-orientation. The matrix element of a direct transition reads

$$\mathcal{H}^{(2)}_{a\rightarrow b} = a(Q_5^2 - Q_6^2) + bQ_2Q_3 + cQ_4Q_5;$$

$$a = \frac{9\sqrt{3}}{8}\left(\Lambda_1 - \frac{825}{8}\Lambda_2\right), \quad b = -18\left(\Lambda_1 - \frac{375}{16}\Lambda_2\right), \quad c = i\frac{45\sqrt{3}}{8}\Lambda_2; \quad (17)$$

$$\Lambda_1 = ee'\alpha\overline{r^2}R^{-5}, \quad \Lambda_2 = ee'\beta\overline{r^4}R^{-7}, \quad \alpha = -3\beta = 2/21.$$

and the probabilities of the transitions $a \rightarrow b$ read

$$w_{a,b} = \hbar^{-2}\left[a^2(\overline{Q_5^4}\rho_{55} + \overline{Q_6^4}\rho_{66}) + b^2\overline{Q_2^2}\,\overline{Q_3^2}\rho_{23} + c^2\overline{Q_4^2}\,\overline{Q_5^2}\rho_{45}\right] e^{-\delta/2kT} \quad (20).$$



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Theory of spin-lattice relaxation... S/056/61/041/003/009/020 B125/B102

The temperature dependence of (20) is given by $w_{a,b} \sim \exp(-\delta/2kT)\mathrm{cth}^2(\hbar\omega_j/2kT)\lambda_j$, where $\lambda_j \sim \exp(-E/RT)$; the parameter E has the significance of a "viscosity barrier" of the liquid. The 1.8-fold broadening of the line in the same temperature range, observed by Kozyrev, is close to the calculated value. There are 1 figure and 12 references: 5 Soviet and 7 non-Soviet. The three most recent references to English-language publications read as follows: J. R. Senitzky. Phys. Rev., 119, 670, 1960; H. J. Mc Connell. J. Chem. Phys., 25, 709, 1956; B. R. Mc Garvey. J. Phys. Chem., 61, 1232, 1957.

ASSOCIATION: Kazanskiy pedagogicheskiy institut (Kazan' Pedagogical Institute)

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26708
S/056/61/041/005/023/038
B102/B138

24.7900 (1055,1144,1482)

AUTHORS: Timerov, R. Kh., Valiyev, K. A.

TITLE: Theory of nuclear resonance in paramagnetic media

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 5(11), 1961, 1566-1575

TEXT: The influence of paramagnetic atoms on nuclear resonance results in the reduction of the relaxation times of the components of nuclear magnetization and in a shift $\delta$ of the nuclear resonance frequency $\omega_I$. Where there is low concentration of paramagnetic atoms their effect can be described by an additive law which has been verified theoretically as well as experimentally. In the case of high concentrations, which is that investigated in the present paper, exchange interaction between paramagnetic ions has to be taken into account. This determines the exchange of electron spin orientations reduces the effect of the paramagnetic atoms on relaxation times $T_{\parallel}$ and $T_{\perp}$ of the nuclear magnetization components. The authors have developed a theory of the shape and width $(T_{\perp}^{-1})$ of a

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nuclear resonance line which allows for the exchange interactions between paramagnetic atoms, which are in their turn modulated by the thermal motion in the system. The system contains $N_I$ magnetic nuclei and $N_S$ paramagnetic atoms per unit volume. The shape of the absorption line $I(\omega)$ is represented as a Fourier transform of the autocorrelation function $G(t)$ of the projection of the magnetic moment in the direction x of the variable magnetic field: $I(\omega) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} G(t)e^{-i\omega t}dt$; $G(t) = \langle\{\hat{M}_x(t)\hat{M}_x(0)\}\rangle$. In order to find the parts of the Hamiltonian the first terms of the series $G(t) = \sum G_n(t)$ are determined ($G_1(t) = 0$):

$$G_0(t) = \tfrac{1}{6}N_I\gamma_I^2 I(I+1)\,[e^{i\omega_I t} + \text{к. с.}], \tag{7}$$

$$G_2(t) = -\tfrac{1}{6}N_I\gamma_I^2 I(I+1)\Big[e^{i\omega_I t}\sum_\gamma \sigma_\gamma^2\int_0^t d\tau\,(t-\tau)\,e^{i\omega_\gamma\tau} f_\gamma(\tau) + \text{к. с.}\Big], \tag{8}$$



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with

$$\sigma_\gamma^2 = \hbar^{-2} \langle | [\hat{M}_+^{(0)}, \hat{\mathcal{H}}'_\gamma(0)] |^2 \rangle / \langle | \hat{M}_+^{(0)} |^2 \rangle, \quad \hat{M}_\pm^{(0)} = \gamma_I \sum_k (\hat{I}_k^x \pm i\hat{I}_k^y), \tag{9}$$

$$f_\gamma(\tau) = \hat{N} \langle [\hat{M}_+^{(0)}, \hat{\mathcal{H}}'_\gamma(\tau)] [\hat{\mathcal{H}}'_{-\gamma}(0), \hat{M}_-^{(0)}] \rangle, \tag{10}$$

$$\hat{\mathcal{H}}'(\tau) = \sum_\gamma e^{i\omega_\gamma \tau} \hat{\mathcal{H}}'_\gamma(\tau) = \sum_\gamma e^{i\omega_\gamma \tau} \exp(i\tau\hat{\mathcal{H}}_2/\hbar)\, \hat{\mathcal{H}}'_\gamma \exp(-i\tau\hat{\mathcal{H}}_2/\hbar). \tag{11}$$

$\sigma_\gamma^2$ is the contribution from $\hat{\mathcal{H}}'_\gamma$ to the second moment of the resonance line (in frequency units), $f_\gamma(\tau)$ - the correlation function of the $\hat{\mathcal{H}}'_\gamma(\tau)$ values, which vary with time due to the effect of $\hat{\mathcal{H}}_2$, and $\hat{N}$ is a formal operator: $NA(t) = A(t)/A(0)$; the prime denotes the perturbation terms, + K. C. means: + complex conjugates. For $G_0(t) + G_2(t)$

$$e^{i\omega_I t}\Big\{1 - \sum_{\alpha=1,2} \sum_{\gamma,\beta} \sigma^2_{\gamma\beta,\alpha} \int_0^t d\tau\, (t-\tau)\, e^{i(\gamma\omega_I + \beta\omega_S)\tau} \times \times \exp[-|\tau|\tau_\alpha^{-1} - |\tau| T_\beta^{-1} - \omega_e^2 F(\tau)]\Big\} + \text{K. c.}, \tag{21}$$

or, approximately,

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$$\exp\left\{i\omega_I t - \sum_{\alpha=1,2}\sum_{\gamma,\beta}\sigma^2_{\gamma\beta,\alpha}\int_0^t d\tau\,(t-\tau)e^{i(\gamma\omega_I+\beta\omega_S)\tau}\times\right.$$
$$\left.\times\exp\left[-|\tau|\,\tau_\alpha^{-1}-|\tau|\,T_\beta^{-1}-\omega_e^2F(\tau)\right]\right\}+\text{к. с.} \qquad (22)$$

is found; In the expression (21) only a constant factor is omitted. Then the line shape is calculated for two limiting cases: fast (fluid) and slow (viscous liquid or solid) motion of the molecules of the system. In the first case, $T_\perp^0 \gg \tau_e$, from (22) or another formula the half-width of a Lorentz line with its center at $\omega_I + \delta$ is found to be

$$\Delta\omega_{1/2} = S(S+1)\sigma_{IS}^2\left\{\frac{1}{3}K_{01}+\frac{1}{2}\frac{K_{11}^{-1}}{K_{11}^{-2}+\omega_S^2}+\frac{1}{4}\frac{K_{01}^{-1}}{K_{01}^{-2}+\omega_I^2}+\right.$$
$$\left.+\frac{1}{2}\frac{K_{11}^{-1}}{K_{11}^{-2}+(\omega_S+\omega_I)^2}+\frac{1}{12}\frac{K_{11}^{-1}}{K_{11}^{-2}+(\omega_I-\omega_S)^2}\right\}+$$
$$+\frac{1}{3}S(S+1)\langle A^2\rangle\left\{K_{02}+\frac{K_{12}^{-1}}{K_{12}^{-2}+(\omega_I-\omega_S)^2}\right\}, \qquad (23)$$

The shift (in rad/sec) is determined by



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$$-\delta = S(S+1)\sigma_{IS}^2\left\{\frac{1}{2}\frac{\omega_I}{K_{01}^{-2}+\omega_I^2}+\frac{1}{2}\frac{\omega_I+\omega_S}{K_{11}^{-2}+(\omega_I+\omega_S)^2}+\right.$$

$$\left.+\frac{1}{12}\frac{\omega_I-\omega_S}{K_{11}^{-2}+(\omega_I-\omega_S)^2}\right\}+\frac{1}{3}S(S+1)\langle A^2\rangle\frac{\omega_I-\omega_S}{K_{12}^{-2}+(\omega_I-\omega_S)^2}; \quad (24)$$

$$K_{0,\alpha}^{-1} = \tau_\alpha^{-1}+T_1^{-1}+\tau_e\omega_e^2, \qquad K_{1,\alpha}^{-1} = \tau_\alpha^{-1}+T_2^{-1}+\tau_e\omega_e^2. \quad (25)$$

The reciprocal relaxation times $T_1^{-1}$ and $T_2^{-1}$ are, for paramagnetic ions of the $Cu^{2+}$, $VO^{2+}$ type, of the order of $10^8$ sec$^{-1}$, for others much shorter still; $\tau_1^{-1} \sim 10^{11}$ sec$^{-1}$. Estimations show that very different situations may arise. For large $\omega_e^2$ the half-width can be approximated by $\Delta\omega_{1/2} = S(S+1)\left[\frac{20}{12}\sigma_{IS}^2 + \frac{2}{3}\langle A^2\rangle\right]/\tau_e\omega_e^2$ and for strong h-f fields by $(\Delta\omega_{1/2})_{h-f} = \frac{71}{22}S(S+1)\sigma_{IS}^2K_{\beta,1} + \frac{1}{3}S(S+1)\langle A^2\rangle K_{\beta,2}$. For slow thermal motion, $T_\perp^0 \ll \tau_e$, the nuclear absorption lines are, near their maximum, of Lorentzian shape, their half width is described by

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$$\Delta\omega_{1/2} = \sqrt{\frac{\pi}{2}}\frac{1}{\omega_e}\sum_{\gamma=0}^{1}\sum_{\beta=-1}^{1}\sigma_{\gamma\beta}^2 \operatorname{Re} L(z_{\gamma\beta}), \tag{28}$$

$$\omega_I + \delta = \omega_I - \sqrt{\frac{\pi}{2}}\frac{1}{\omega_e}\sum_{\substack{\gamma=0 \\ |\gamma|+|\beta|\neq 0}}^{1}\sum_{\beta=-1}^{1}\sigma_{\gamma\beta}^2 \operatorname{Im} L(z_{\gamma\beta}); \tag{29}$$

$$z_{\gamma\beta} = (\gamma\omega_I + \beta\omega_S - iT_\beta^{-1})/\omega_e\sqrt{2}, \tag{30}$$

$$L(z) = e^{-z^2} - i2W(z)/\sqrt{\pi}, \qquad W(z) = e^{-z^2}\int_0^z e^{x^2}dx. \tag{31}$$

For ions of the $Mn^{2+}$, $Cr^{3+}$, $VO^{2+}$ type (strong fields)

$$\Delta\omega_{1/2} = \sqrt{\frac{\pi}{2}}\omega_e^{-1}\left[\sigma_{00}^2 + \sigma_{10}^2 + \sum_{\gamma=0,1}\sum_{\beta=\pm1}\sigma_{\gamma\beta}^2 \exp\left[-\frac{(\gamma\omega_I+\beta\omega_S)^2}{2\omega_e^2}\right]\right], \tag{32}$$

holds, and the shift is given by



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$$-\delta = \sqrt{2}\omega_e^{-1} S(S+1)\left[\tfrac{5}{12}\sigma_{IS}^2 - \tfrac{1}{3}\langle A^2\rangle\right] e^{-v^2}\int_0^v e^{x^2}dx, \qquad (34)$$

With (32) and (34) the exchange frequency $\omega_e$ can be determined when $\Delta\omega_{1/2}$ and $\delta$ are measured. For weak fields but strong interaction

$$\Delta\omega_{1/2} = \sqrt{\frac{\pi}{2}}\frac{1}{\omega_e} S(S+1)\left\{\left(\frac{7}{12}\sigma_{IS}^2 + \frac{1}{3}\langle A^2\rangle\right)e^{u^2}\left(1 - \frac{2}{\sqrt{\pi}}\int_0^u e^{-x^2}dx\right) + \right.$$
$$\left. + \left(\frac{13}{12}\sigma_{IS}^2 + \frac{1}{3}\langle A^2\rangle\right)e^{v^2}\left[1 - \frac{2}{\sqrt{\pi}}\int_0^v e^{-x^2}dx\right]\right\}, \quad (35) \quad u = 1/\sqrt{2}\,T_1\omega_e, \quad v = 1/\sqrt{2}\,T_2\omega_e.$$

holds, and for very strong interaction ($T_1^{-1}$, $T_2^{-1} \ll \omega_e$):

$$\Delta\omega_{1/2} = \sqrt{\frac{\pi}{2}}\;\frac{1}{\omega_e}\;S(S+1)\left[\frac{5}{3}\sigma_{IS}^2 + \frac{2}{3}\langle A^2\rangle\right].$$

There are 14 references: 5 Soviet and 9 non-Soviet. The four most recent references to English-language publications read as follows: N. Bloembergen. J. Chem. Phys. 27, 572, 1957; R. Kubo, K. Tomita. J. Phys. Soc. Japan, 9, 888, 1954; T. Moriya. Progr. Theor. Phys., 16, 23,



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Theory of nuclear resonance in... S/056/61/041/005/023/038
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1956; T. Moriya. Progr. Theor. Phys., 16, 641, 1956.

ASSOCIATION: Fiziko-tekhnicheskiy institut Kazanskogo filiala Akademii nauk SSSR (Physicotechnical Institute of the Kazan' Branch of the Academy of Sciences USSR). Kazanskiy pedagogicheskiy institut (Kazan' Pedagogical Institute)

SUBMITTED: May 22, 1961 (initially)
October 15, 1961 (after revision)

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VALIYEV, K.A.

Study of electrolyte solutions in dipole liquids by the method of magnetic resonance. Zhur.strukt.khim. 3 no.6:653-661 '62.
(MIRA 15:12)
(Electrolyte solutions—Dipole moments)
(Nuclear magnetic resonance and relaxation)

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38528

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E039/E420

24.3200

AUTHORS: Valiyev, K.A., Eskin, L.D.

TITLE: The rotational diffusion of molecules and light scattering in liquids. I. Spherical molecules

PERIODICAL: Optika i spektroskopiya, v.12, no.6, 1962, 758-764

TEXT: The rotational diffusion of spherically symmetrical molecules is examined by means of three dimension group rotation theory, taking into account all three rotational degrees of freedom. From the Fokker-Planck equation are derived equations for bound rotational diffusion, by a generalization of the equations of rotational diffusion of linear molecules. Solutions of these equations (probability of transitions) are given in the form of generalized spherical functions and are used for examining the scattering of light in liquids. The broadening of lines by dissipative processes, such as the transition of the energy of molecular oscillation into thermal motion of molecules, is considered. It is shown that the half width of the observed lines increases with increase in the value of its coefficient of depolarization. This means that the width of the polarized lines

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The rotational diffusion ... S/051/62/012/006/011/020
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is determined by the dissipation of the oscillatory enbrgy of the molecules.

SUBMITTED: May 12, 1961

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

S/051/62/013/004/002/023
E032/E314

AUTHOR: Valiyev, K.A.

TITLE: Rotational diffusion of molecules and the scattering of light in liquids II. Asymmetric and symmetric spinning-top models

PERIODICAL: Optika i spektroskopiya, v. 13, no. 4, 1962, 505 - 510

TEXT: In a previous paper (the author and L.D. Eskin - Opt. i spektr., 12, 758, 1962) the molecules of the liquid were assumed to be spherical. This theory is extended in the present paper to include non-spherical molecules. The Brownian motion is characterized by a diffusion tensor $D_{jk}$ and the aim of the paper is to obtain relationships between the spectral composition of the scattered light, on the one hand, and the scattering properties of the molecules and their kinetic properties, on the other. The scattering properties are determined by the polarizability tensor and the kinetic properties by the diffusion tensor. The analysis starts with Favro's equation (Phys. Rev., 119, 53, 1960) for the rotational diffusion of non-spherical molecules,

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Rotational diffusion of .... S/051/62/013/004/002/023
E032/E314

Although Favro himself used the Cayley-Klein parameters, the present author finds Euler's angles more convenient for the description of the orientation of the molecules. The Green function, satisfying Favro's equation and the appropriate initial conditions, is then set up and the dipole moment induced in a molecule by the incident wave is considered. A general expression is derived for the Green function for the rotational diffusion of asymmetric and symmetric spinning tops. It is shown that the background of a Rayleigh line takes the form of a superposition of five Lorentz curves in the case of asymmetric spinning tops and three Lorentz curves in the case of symmetric spinning tops. These results can also be applied to Raman scattering. The results obtained previously for the relation between the scattered spectrum and the depolarization are shown to remain in force. The temperature-dependence of the line width and the depolarization coefficient is also the same as before.

SUBMITTED: July 22, 1961

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

34047

S/056/62/042/002/031/055
B108/B104

24,2200(1068,1158,1144)

AUTHORS: Valiyev, K. A., Zaripov, M. M.

TITLE: Effect of the shape of molecules on the magnetic relaxation rate in liquids

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 2, 1962, 503 - 510

TEXT: The theory of magnetic relaxation is generalized to nonspherical molecules whose Brownian rotation is characterized by the diffusion tensor $D_{jk} = \frac{1}{2} kT(\beta^{-1}_{jk} + \beta^{-1}_{kj})$. $\beta_{jk}$ is the viscosity tensor of the liquid in question. The rotational diffusion equation for arbitrary particles is $\partial w/\partial t = - \hat{M}_j D_{jk} \hat{M}_k w$, where $\hat{M}_j$ is the operator of rotation about the axis $j(x,y,z)$. The Green's function of the diffusion equation is expanded into a series of the eigenfunctions $\psi_\nu$ of the operator $\hat{M}_j D_{jk} \hat{M}_k$, $\hat{M}_j D_{jk} \hat{M}_k \psi_\nu = D_\nu \psi_\nu$. Thus, $G(t) = \sum_\nu \psi^*_\nu(\alpha^o, \beta^o, \gamma^o)\psi_\nu(\alpha,\beta,\gamma)\exp(-D_\nu |t|)$. The $\alpha$'s etc. are the

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Effect of the shape of molecules...

S/056/62/042/002/031/055
B108/B104

Euler angles (orientation) of the molecule at the times t = 0 and t, respectively. The $\psi_\nu$ in the equation for G(t) are the orthonormalized wave functions of a quantum mechanical rotator, the $D_\nu$ can be found from the eigenvalues of the rotator energy by substituting $D_{jk} \to (1/2)\hbar^2 J^{-1}_{jk}$ where $J_{jk}$ is the tensor of inertia of the rotator. The D, $\psi$, and G are calculated for symmetrical and unsymmetrical rotators. For quadrupole interaction, the correlation function K and the transition probability A in nuclear spin relaxation are

$$K_{M,\,M-m}(t) = \overline{|\mathcal{H}'_{M,\,M-m}|^2} \sum_{n=-2}^{2} \Omega_n \exp(-D^{(2)}_{mn}|t|),$$

$$A_{M,\,M-m} = \frac{2\pi}{\hbar^2} \overline{|\mathcal{H}'_{M,\,M-m}|^2} \sum_n \Omega_n \rho(D^{(2)}_{mn}),$$

$$\Omega^2_{\pm 2} = \frac{3}{2} g_\varphi^{-2} |\varphi'_{\pm 2}|^2 = \frac{3}{2} g_\varphi^{-2} [\varphi^2_{\xi\eta} + \frac{1}{4}(\varphi_{\xi\xi} - \varphi_{\eta\eta})^2],$$

$$\Omega^2_{\pm 1} = \frac{3}{2} g_\varphi^{-2} |\varphi'_{\pm 1}|^2 = \frac{3}{2} g_\varphi^{-2} [\varphi^2_{\xi\zeta} + \varphi^2_{\eta\zeta}]^2, \qquad \Omega^2_0 = \frac{3}{2} g_\varphi^{-2} \varphi^2_0 = \frac{9}{4} g_\varphi^{-2} \varphi^2_{\zeta\zeta},$$

$$D^{(2)2}_{m,\pm 2} = 2D_1 + 4D_3, \qquad D^{(2)2}_{m,\pm 1} = 5D_1 + D_3, \qquad D^{(2)}_{m,0} = 6D_1,$$

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

Effect of the shape of molecules... S/056/62/042/002/031/055
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$$\Omega^a_{-2} = \frac{3}{4} g_\varphi^{-2} |\varphi'_2 - \varphi'_{-2}|^2 = 3 g_\varphi^{-2} \varphi^2_{\xi\eta}, \quad \Omega^a_{-1} = \frac{3}{4} g_\varphi^{-2} |\varphi'_1 - \varphi'_{-1}|^2 = 3 g_\varphi^{-2} \varphi^2_{\xi\zeta},$$

$$\Omega^a_{1,2} = \frac{3}{4} g_\varphi^{-2} \left| \sqrt{\frac{c_\pm}{4g_D}} (\varphi'_2 + \varphi'_{-2}) \mp \sqrt{\frac{c_\mp}{2g_D}} \varphi'_0 \right|^2 = \frac{3}{4} g_\varphi^{-2} \left| \sqrt{\frac{c_\pm}{4g_D}} (\varphi_{\xi\xi} - \varphi_{\eta\eta}) \mp \right.$$

$$\left. \mp \sqrt{\frac{3c_\mp}{4g_D}} \varphi_{\zeta\zeta} \right|^2, \quad \Omega^a_0 = \frac{3}{4} g_\varphi^{-2} |\varphi'_1 + \varphi'_{-1}|^2 = 3 g_\varphi^{-2} \varphi^2_{\eta\zeta};$$

$$\rho(x) = (x/\pi)/(x^2 + \omega^2_{MM'}).$$

$\xi, \eta, \zeta$ are the coordinates of the system of the molecule. $g_\varphi$ is the invariant of the tensor $\varphi_{ij} = \partial^2\varphi/\partial x_i \partial x_j$, where $\varphi$ is the potential of the molecular electron shell. $\varphi_{\pm 2} = \frac{1}{2}(\varphi_{xx} - \varphi_{yy}) \pm i\varphi_{xy}$; $\varphi_{\pm 1} = \mp\varphi_{xz} - i\varphi_{yz}$; $\varphi_0 = \frac{\sqrt{6}}{2}\varphi_{zz}$. The perturbation $\mathcal{H}'$ which causes the transition between the stationary levels is due to the quadrupole moment of the nucleus in the charge shell of the molecule. The external field $h_0$ goes in the z direction. The superscripts s and a respectively refer to symmetric and unsymmetric rotators. A similar calculation is performed for the relaxation owing to intramolecular dipole-dipole interaction, where $\mathcal{H}' = \mathcal{H}_{jk}$

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$$= \sum_{m=-2}^{2} \mathcal{H}_{jk}^{m} = P_{jk} \sum_{m} A_{-m} \{jk\}_{-m} Y_{2m}(\Theta_{jk}, \varphi_{jk})$$ and

$$\{jk\}_2 = \{jk\}_{-2}^{*} = J_j^{+} J_k^{+}, \quad \{jk\}_1 = \{jk\}_{-1}^{*} = J_j^{+} J_{kz} + J_{jz} J_k^{+},$$
$$\{jk\}_0 = J_{jz} J_{kz} - \frac{1}{4}(J_j^{+} J_k^{-} + J_j^{-} J_k^{+}), \quad J^{\pm} = J_x \pm i J_y,$$
$$A_2 = A_{-2} = A_1 = -A_{-1} = \sqrt{6\pi/5}, \quad A_0 = -\sqrt{16\pi/5}, \tag{26}$$
$$P_{jk} = g_{J_j} g_{J_k} \beta_N^2 r_{jk}^{-3}.$$

The relaxation owing to anisotropy of the g-factor and of the hyperfine structure constant $a_{ij}$ is calculated with the relations

$$\mathcal{H} = \mathcal{H}_0 + \mathcal{H}', \quad \mathcal{H}_0 = g^{\mathrm{I}} \beta S_z h_0 + a^{\mathrm{I}} S_z J_z, \quad g^{\mathrm{I}} = \frac{1}{3} g_{ii}, \quad a^{\mathrm{I}} = \frac{1}{3} a_{ii},$$
$$\mathcal{H}' = g_{ij}^{\mathrm{II}} \beta h_i S_j + a_{ij}^{\mathrm{II}} J_i S_j, \quad g_{ij}^{\mathrm{II}} = g_{ij} - \delta_{ij} g^{\mathrm{I}}, \quad a_{ij}^{\mathrm{II}} = a_{ij} - \delta_{ij} a^{\mathrm{I}}, \quad i, j = x, y, z. \tag{32}$$

The relaxation transition probabilities are then

$$A_{M_s, M_J; M_s-1, M_J} = \frac{\pi}{15\hbar^2} (S + M_s)(S - M_s + 1) g_\rho^2 \sum_n \Omega_{n\rho} (D_{m,n}^{(2)}), \tag{39.1}$$

$$A_{M_s, M_J; M_s, M_J-1} = \frac{\pi}{15\hbar^2} (J + M_J)(J - M_J + 1) M_s^2 g_a^2 \sum_n \Omega_{n\rho} (D_{m,n}^{(2)}), \tag{39.2}$$



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34652
S/056/62/042/002/042/055
B108/B138

24.2200 (1055,1144,1158)

AUTHORS: Valiyev, K. A., Timerov, R. Kh.

TITLE: Theory of nuclear resonance in paramagnetic media. II. Spin-lattice relaxation

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 2, 1962, 597 - 599

TEXT: On the basis of a previous paper (ZhETF, 41, 1566, 1961) the authors calculated the longitudinal nuclear spin-lattice relaxation time $T_{\parallel}$. Kubo and Tomita (Ref. 2, see below) have shown that $T_{\parallel}$ in linear approximation can be calculated from the formula

$$T_{\parallel}^{-1} = \frac{1}{2}\sum_{\gamma\neq 0}\sigma_{\gamma}^{(z)2}\int_{-\infty}^{\infty} f_{\gamma}(\tau)\exp(i\gamma\omega_I\tau)\,d\tau; \quad (1)$$

$$\sigma_{\gamma}^{(z)2} = \hbar^{-2}\langle|[\hat{M}_z, \hat{\mathcal{H}}'_{\gamma}(0)]|^2\rangle/\langle\hat{M}_z^2\rangle, \quad (2)$$

$$f_{\gamma}(\tau) = \langle[\hat{M}_z, \hat{\mathcal{H}}'_{\gamma}(\tau)][\hat{\mathcal{H}}'_{-\gamma}(0), \hat{M}_z]\rangle/\langle|[\hat{M}_z, \hat{\mathcal{H}}'_{\gamma}(0)]|^2\rangle. \quad (3).$$

$\sigma_{\gamma}^{(z)2}$ has the meaning of the mean square z-component of the internal

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field (frequency units) produced in the nucleus by the non-secular part of the perturbation $\mathcal{H}'_\gamma$, $\gamma \neq 0$. This perturbation changes with time owing to the precession, relaxation, and exchange motions in the electron spin system and to the thermal motion of the particles in the medium. The energy transfer caused by the variation of the perturbation is characterized by $T_\parallel$. Considering all these factors, the authors found that $T_\parallel^{-1} = 2(\Delta\omega_{1/2})_{nS}$ (7), where $(\Delta\omega_{1/2})_{nS}$ is that contribution to the resonance line width which goes back to the non-secular part of the perturbation $\mathcal{H}'_\gamma$, $\gamma \neq 0$. Formula (7) is evaluated for the two limiting cases of fast and slow thermal motion in the medium. Qualitatively, $T_\parallel^{-1}$ depends on the same factors as $T_\perp^{-1}$. The numerical difference between $T_\parallel$ and $T_\perp$ is due not only to their different dependences on the Larmor frequencies $\omega_S$, $\omega_I$ but also to the contact interaction between electronic and atomic spins. Therefore, the contact interaction between paramagnetic particles and the nuclear spins can be determined from the ratio $T_\parallel/T_\perp$ (Ref. 3, see below). There are 1 table and 3 references: 1 Soviet and 2 non-Soviet.

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Theory of nuclear resonance in ... S/056/62/042/002/042/055
B108/B138

The 2 references to English-language publications read as follows: Ref. 2: R. Kubo, K. Tomita. J. Phys. Soc., Japan, 9, 888, 1954; Ref. 3: N. Bloembergen. J. Chem. Phys., 27, 572, 1957.

ASSOCIATION: Kazanskiy pedagogicheskiy institut (Kazan' Pedagogical Institute)

SUBMITTED: September 8, 1961

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

S/056/63/044/002/022/065
B102/B186

AUTHORS: Valiyev, K. A., Timerov, R. Kh., Yul'met'yev, R. M.

TITLE: The influence of the molecular shape on the magnetic relaxation rate in liquids. II

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 522-529

TEXT: The authors continue previous investigations (ZhETF, 42, 503, 1962; Optika i spektroskopiya, 13, 505, 1962) on the Brownian rotation of molecules in a fluid. The probabilities of relaxative transitions between magnetic sublevels of nonspherical fluid particles have been calculated. These results are now used to determine the magnetic-resonance line widths and longitudinal relaxation times for such particles. The Kubo-Tomita method (J. Phys. Soc. 9, 888, 1954) is applied to obtain a relation between the relaxation times $T_{1,2}$ and the main values $D_{1,2,3}$ of the tensor $D_{ii}$ or rotational diffusion that characterizes the Brownian rotation of the molecules. The calculations are made for quadrupole and dipole spin-

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The influence of the ...

spin interactions, and also for anisotropic g-factors, hyperfine and Stark interaction constants. The magnetic-resonance line half-width $\Delta\omega_{1/2} = 1/T_2 = \sum_{\beta} \sigma^2_{1\beta}\tau'_{1\beta}$ and $1/T = \sum_{\beta} \sigma^2_{o\beta}\tau'_{o\beta}$. With

$$f_{\alpha\beta}(\tau) = \langle\varphi_{-\beta}(\tau)\varphi_{\beta}(0)\rangle / \langle|\varphi_{\beta}|^2\rangle = f(\tau) =$$

$$= \frac{1}{8\pi^2}\int\varphi_{\beta}(\alpha^0, \beta^0, \gamma^0)\varphi_{-\beta}(\alpha, \beta, \gamma)\, G(\alpha, \beta, \gamma; \tau|\alpha^0, \beta^0, \gamma^0; 0) \times \tag{15}$$

$$\times \sin\alpha^0 d\alpha^0 d\beta^0 d\gamma^0 \sin\alpha\, d\alpha\, d\beta\, d\gamma / \tfrac{3}{16}g_{\varphi}^2.$$

$$\tau'_{\alpha\beta} = \tau'_{\beta} = \sum_{l}\Omega_l\rho(D_{kl}, \beta) = \sum_{l}\Omega_l D_{kl}(D^2_{kl} + \beta^2\omega^2_z)^{-1}. \tag{17}$$

$$\frac{1}{T_2} = \frac{1}{25}\left(\frac{eQg_{\varphi}}{\hbar}\right)^2 \frac{I(I+1)-3/4}{I^2(2I-1)^2}\sum_{l}\Omega_l\left[\rho(D_{kl}, 0) + \tfrac{5}{3}\rho(D_{kl}, 1) + \tfrac{2}{3}\rho(D_{kl}, 2)\right] \tag{21}$$

$$\frac{1}{T_1} = \frac{1}{25}\left(\frac{eQg_{\varphi}}{\hbar}\right)^2 \frac{I(I+1)-3/4}{I^2(2I-1)^2}\sum_{l}\Omega_l\left[\frac{2}{3}\rho(D_{kl}, 1) + \frac{8}{3}\rho(D_{kl}, 2)\right]. \tag{22}$$

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is obtained. For magnetic relaxation caused by innermolecular spin-spin interaction

$$\frac{1}{T_{\beta}(ij)} = \sum_{l=-2}^{2} \Omega_l(ij) \sum_{\beta=-2}^{2} \sigma^2_{\alpha\beta}(ij) D_{kl}(D^2_{kl} + \beta^2\omega^2_z)^{-1}, \qquad (36)$$

$$\sigma^2_{12} = \sigma^2_{1-1} = \frac{2}{3}\sigma^2_{11} = \frac{2}{3}\sigma^2_{10} = \frac{f}{f}\sigma^2_{0\pm 2} = 2\sigma^2_{0\pm 1} = \frac{3}{3}\sigma^2,$$
$$\sigma^2_{1-2} = \sigma^2_{00} = 0; \quad \sigma^2 = \frac{3}{5} I(I+1)\gamma_i^4\hbar^2 r_{ij}^{-6}, \qquad (37)$$

is obtained in the case of equivalent nuclei. In the case of electron resonance in liquids, line width and relaxation time are given by

$$\Delta\omega_{1/2,m} = \frac{2}{15}\hbar^{-2} \sum_{l=-2}^{2} \left\{ \left[ \frac{2}{3} g_p^2 + \frac{1}{2} g_a^2 / m \right] \Omega_l^{(0,m)} \rho(D_{kl}, \omega_{0,m}) + \right. \qquad (44)$$
$$+ \left[ \frac{1}{3} g_p^2 + \frac{7}{12} g_a / m \right] \Omega_l^{(-1,m)} \rho(D_{kl}, \omega_{-1,m}) + \frac{6}{5} \left( S(S+1) - \frac{3}{4} \right) g_d^2 \Omega_l^f \times$$



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$$\times \left[\rho\left(D_{kl}, \omega_{0,0}\right) + \frac{5}{3}\rho\left(D_{kl}, \omega_{10}\right) + \frac{2}{3}\rho\left(D_{kl}, \omega_{-2,0}\right)\right]\Big\},$$

$$T_{1m}^{-1} = \frac{4}{15}\hbar^{-2}\sum_{l=-2}^{2}\Big\{\left[\frac{1}{2}g_p^2 + \frac{7}{18}g_a^2 f_m\right]\Omega_l^{(-1,m)}\rho\left(D_{kl}, \omega_{-1,m}\right) + \qquad (45).$$

$$+ \frac{4}{5}\left(S(S+1) - \frac{3}{4}\right)\Omega_l^d g_d^2\left[\rho\left(D_{kl}, \omega_{1,0}\right) + 4\rho\left(D_{kl}, \omega_{2,0}\right)\right]\Big\}.$$

It may be seen that for $S > 1/2$ the main contribution to the line width is due to Stark interaction of the particle spins. Apart from the broadening caused by the Brownian rotation, there is also a broadening due to the interaction between spin and inner oscillations of the molecule. The latter is equal for all hyperfine components, as is the case for the Stark broadening.

ASSOCIATION: Kazanskiy pedagogicheskiy institut (Kazan' Pedagogical Institute), Fiziko-tekhnicheskiy institut Kazanskogo filiala Akademii nauk SSSR (Physicotechnical Institute of the Kazan' Branch of the Academy of Sciences USSR)

SUBMITTED: June 11, 1962



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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.A.; YEMEL'YANOV, M.I.; SAMIGULLIN, F.M.

Spin echo method of separate determination of the coefficients of progressive diffusion of molecules in a two-component mixture. Zhur. strukt. khim. 5 no.3:371-376 My-Je '64.

(MIRA 18:7)

1. Kazanskiy pedagogicheskiy institut.

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ASSOCIATION: Kazanski gospedinstitut (Kazan' State Pedagogical Institute)

SUBMITTED: 11Feb63

VALIYEV, K.A.

Determination of the structure of electrolyte solutions by the method of magnetic resonance. Part 2: Role of ion-ion reactions in the quadrupole relaxation of the nuclear spins of diamagnetic ions. Zhur. strukt. khim. 5 no.4:519-529 Ag '64. (MIRA 18:3)

1. Kazanskiy gosudarstvennyy pedagogicheskiy institut.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.A.; YEMEL'YANOV, M.I.

Self-diffusion of water molecules in aqueous solutions of electrolytes. Part 1:Metal chlorides. Zhur. strukt. khim. 5 no.5:670-680 S-O '64 (MIRA 18:1)

1. Kazanskiy gosudarstvennyy pedagogicheskiy institut.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.A.; YEMEL'YANOV, M.I.

Study of translation diffusion of the alcohol molecule in mixtures of alcohols and carbon tetrachloride. Zhur. strukt. khim. 5 no.6:814-818 N-D '64. (MIRA 18:4)

1. Kazanskiy gosudarstvennyy pedagogicheskiy institut.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

ACCESSION NR: AP4035479 S/0051/64/016/005/0881/0887

AUTHOR: Valiyev, K.A.; Agishev, A.Sh.

TITLE: Investigation of the character of Brownian rotary movement of molecules in liquids

SOURCE: Optika i spektroskopiya, v.16, No.5, 1964, 881-887

TOPIC TAGS: Brownian motion mechanics, molecular rotation, nuclear magnetic resonance, electron paramagnetic resonance

ABSTRACT: Rotary Brownian movement of molecules in a liquid is defined as chance wandering of the orientation of the molecules with respect to the laboratory system of coordinates. The most convenient parameters to use in treating the problem are the Euler angles. It is assumed that the ambience of the molecule gives rise to a potential barrier, which the molecule must overcome in rotating to the orientation in which the energy of its interaction with its neighbors attains another minimum. The problem is first approached theoretically making use of the equations describing rotational diffusion (M.A.Leontovich, Statisticheskaya fizika/Statistical Physics/ M.-L.1944), and tensor analysis is employed to find the relation between ro-

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

ACCESSION NR: AP4035479

tation through a given angle and the correlation time (the time between two successive rotations). Some experimental data obtained as a result of spin echo measurements on solutions of nitrobenzene and camphor in $CS_2$ and $CCl_4$ are described. These are then discussed from the standpoint of the theory and evaluations are made of the mean angle of rotation on the basis of Langevin equations for rotation of molecules. Use of the theory of Brownian rotation of molecules in the diffusion approximation appears to be justified, although it is noted that the theoretical evaluations of the mean angle of rotation may actually be underestimates. Orig.art.has: 9 formulas and 1 table.

ASSOCIATION: none

SUBMITTED: 18Jul63 DATE ACQ: 22May64 ENCL: 00

SUB CODE: ME NR REF SOV: 011 OTHER: 007

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

L 15004-66 EWT(1)/T IJP(c) GG

ACC NR: AP6001641 SOURCE CODE: UR/0051/65/019/006/0897/0903

AUTHOR: Ivanov, Ye. N.; Valiyev, K. A.

ORG: none

29
B

TITLE: Theory of the shape and width of depolarized lines in the Raman spectra of molecular crystals

SOURCE: Optika i spektroskopiya, v. 19, no. 6, 1965, 897-903

TOPIC TAGS: Raman scattering, molecular crystal, single crystal, line width, spectral line

ABSTRACT: A solution of the problem of random walks is used for developing a theory of Raman scattering for molecular crystals. The authors consider the simple but important case where reorientation of individual molecules takes place with respect to a single axis. A solution is given to the one-dimensional problem of random walks for the molecules. The distribution of molecular orientations is determined and is used for explaining the shape and width of lines due to Raman scattering by molecular crystals. It is shown that the shape of the line in the general case consists of superposition of five Lorentz curves. The temperature dependent part of the

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L 15004-66

ACC NR: AP6001641

width, which is isotropic for polycrystals and anisotropic for single crystals, is determined by the average time between two successive rotations. Orig. art. has: 34 figures.

SUB CODE: 20/ SUBM DATE: 10Aug64/ ORIG REF: 009/ OTH REF: 000

Card 2/2

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

L 29010-66 EWT(1) IJP(c) WW/GG

ACC NR: AP6018842 SOURCE CODE: UR/0051/66/020/001/0108/0116

AUTHOR: Valiyev, K. A.; Zapirov, M. M.

35
B

ORG: none

TITLE: Theory of line width of electron paramagnetic resonance of Cussup 2+ ions in aqueous solution

SOURCE: Optika i spektroskopiya, v. 20, no. 1, 1966, 108-116

TOPIC TAGS: electron paramagnetic resonance, copper, aqueous solution, line width

ABSTRACT: Calculation is performed for the width of the EPR line for $Cu^{2+}$ ions in aqueous solution. It is shown that the main reason for broadening of the EPR line is a relazation movement of the electrons of an ion between the two low orbital levels. The broadening of the EPR line upon orbital transition of the ion is caused by the difference in the g-factor of the spin at these orbital levels. It is indicated under what conditions the transitions, with change of one quantum number, lead to "broadening" of the level characterized by another quantum number. Orig. art. has: 28 formulas. [JPRS]

SUB CODE: 20/ SUBM DATE: 19Aug64/ ORIG REF: 007 / OTH REF: 009

Card 1/1 BLG UDC: 535.34:538.113.001

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.G.; MAKURIN, N.D.; VOLOKHOV, S.G.; NEUYMINA, M.M.; SAZONOV, V.V., red.; LEVINA, L.G., tekhn. red.

[Collection of consolidated approximate time norms for the repairing of agricultural equipment] Sbornik ukrupnennykh primernykh normativov vremeni na remont sel'skokhoziaistvennoi tekhniki. Moskva, Izd-vo M-va sel'.khoz. RSFSR. Pt.1. [Tractors, combines and motortrucks] Traktory, kombainy i avtomobili. 1960. 195 p. (MIRA 15:3)

1. Russia (1917- R.S.F.S.R.) Ministerstvo sel'skogo khozyaystva.Upravleniye organizatsii truda i zarabotnoy platy. 2. Otdel tekhnicheskogo normirovaniya Upravleniya organizatsii truda i zarabotnoy platy Ministerstva sel'skogo khozyaystva RSFSR (for Valiyev, Makurin, Volokhov, Neuymina).

(Tractors--Maintenance and repair)
(Motortrucks--Maintenance and repair)
(Combines (Agricultural machinery))--Maintenance and repair)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.G.; VOLOKHOV, S.G.; LEVINA, L.G., tekhn. red.; SAYTANIDI, L.D., tekhn. red.

[Time norms for the repair of agricultural machinery] Normativy vremeni na remont sel'skokhoziaistvennoi tekhniki. Moskva, Izd-vo M-va sel'.khoz. RSFSR, 1962. 306 p. (MIRA 15:4)

1. Russia (1917- R.S.F.S.R.) Ministerstvo sel'skogo khozyaystva. Upravleniye ekonomiki, organizatsii i spetsializatsii sel'skogo khozyaystva, normirovaniya i oplaty truda.
(Agricultural machinery--Maintenance and repair)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, K.G.; VOLOKHOV, S.G.; SHUL'TS, D.O., red.

[Time norms and prices for the repair of agricultural machinery; manual for efficiency experts on state and collective farms] Normativy vremeni i rastsenki na remont sel'skokhoziaistvennoi tekhniki; posobie dlia normirovshchikov sovkhozov i kolkhozov. Moskva, Rossel'khozizdat, 1964. 335 p. (MIRA 17:6)

1. Russia (1917- R.S.F.S.R.) Ministerstvo proizvodstva i zagotovok sel'skokhozyaystvennykh produktov. Upravleniye organizatsii truda i zarabotnoi platy.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, KH. KH.

Dissertation: "Certain Nonlinear Problems of Flow Around Porous Plates." Cand Phys-Math Sci, Moscow State U, Moscow, 1953. (Referativnyy Zhurnal--Mekhanika, Moscow, Aug 54)

SO: SUM 393, 28 Feb 1955

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

SOV/124-58-10-10904

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 10, p 27 (USSR)

AUTHOR: Valiyev, Kh. Kh.

TITLE: Supersonic Flow Over a Composite Plate Under Conditions of Non-linear Law of Permeability (Obtekaniye sostavnoy plastinki sverkhzvukovym potokom pri nelineynom zakone pronitsaniya)

PERIODICAL: Uch. zap. Bukharsk. gos. ped. in-t, Tashkent, 1957, pp 137-141

ABSTRACT: A plane, stationary, potential, supersonic flow over a plate $A_1A_4$ is investigated. The plate comprises a permeable section $A_2A_3$. The angle of attack is less than the stalling angle. The law governing the pressure drop across the permeable section is specified in the form of

$$\Delta p = a_o v_i + b_o v_i^2 ,$$

where $v_i$ is the normal component of the seepage velocity and $a_o$ and $b_o$ are constants. Assuming that with the exception of centered simple waves at points $A_1$ and $A_3$ above the plate and at point $A_2$ underneath it, the stream consists of sections of uniform straight flow, the author applies the laws of conservation to the shock waves and to the permeable section. In this way a system of algebraic

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Supersonic Flow Over a Composite Plate (cont.) SOV/124-58-10-10904

equations is obtained sufficient to solve all the unknowns except for the angle of attack $\alpha$ on the permeable section. The author recommends solving for $\alpha$ by the approximate numerical method, choosing the values in such a manner that they fulfill the law of the pressure drop. There are many misprints. For example, in formula (2.4) the sign before $P_1/\rho_1$ should be changed, as well as that before $b_o$ in (2.16); in formulas (2.5, 2.6) $v_3$ should be written instead of $v_2$; in (2.5) the factor $x^{1/2}$ should not be there and the exponent $1/(x-1)$ over $\rho^x/P_1$ is missing, etc. In formulas (2.19-2.23) the meaning of $M_{a_2}$ is not explained.

R. G. Barantsev

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42096

S/166/62/000/005/008/008
B108/B186

10.2000

AUTHORS: Kotov, Ya. P., Valiyev, Kh. V.

TITLE: Flow of a conducting liquid around an infinitely long cylinder in a magnetic field

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 5, 1962, 88-89

TEXT: The steady flow of a viscous conducting liquid around a cylinder was calculated by R. Ya. Damburg (Izv. AN LatvSSR, 1959, 5(142), 81) for weak magnetic fields. The same is done here for strong magnetic fields (Hartmann number $M \gg 1$). The solution obtained by Damburg for small Reynolds number has the form

$$\left.\begin{aligned} \vec{v} &= \exp(2kx)\,\nabla\Phi_1 + \\ &+ \exp(-2kx)\,\nabla\Phi_2 + \vec{i} \\ p &= 2k\left[\exp(2kx)\frac{\partial\Phi_1}{\partial x} - \right. \\ &\left. - \exp(-2kx)\frac{\partial\Phi_2}{\partial x}\right] + p_\infty \end{aligned}\right\} \quad (1)$$

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with

$$\left.\begin{aligned}\Phi_1 &= \sum_{n=0}^{\infty} C_n(k)\exp(-kr\cos\varphi)\times\\ &\times\left(\frac{\partial}{\partial x}\right)^n K_0(kr)\\ \Phi_2 &= \sum_{n=0}^{\infty} C_n(k)(-1)^{n+1}\times\\ &\times\exp(kr\cos\varphi)\left(\frac{\partial}{\partial x}\right)^n K_0(kr)\end{aligned}\right\} \quad (2).$$

The second-kind Bessel function with imaginary argument, $K_o(kr)$ are written as asymptotic expressions:

$K_o(kr)\approx\sqrt{\frac{\pi}{2kr}}\ \exp(-kr)$, $kr\to\infty$; $k = M/2$. Using this, the authors arrive at the expression $F = \frac{5}{8}\pi\rho\nu v_{\infty}M$ for the pressure exerted by the liquid per



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Flow of a conducting liquid around an ...

unit length of the cylinder. This expression shows that in a strong magnetic field the pressure of the liquid increases in proportion to the magnetic field strength.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UzSSR (Physicotechnical Institute AS UzSSR)

SUBMITTED: April 25, 1962

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV M.

J-4

USSR / Soil Science. Cultivation. Improvement. Erosion.

Abs Jour : Ref Zhur - Biologiya, No 16, 1958, No. 72742

Author : Valiyev, M.

Inst : Pakhta-Aral Sovkhoz and Central Experimental Amelioration Station of the Central Asian Scientific-Research Institute of Irrigation and Amelioration (Zolotaya Orda)

Title : Water Cycle of Soils During Sprinkling in Golodnaya Steppe

Orig Pub : Khlopkovodstvo, 1957, No 7, 49-51

Abstract : Observations conducted at the Pakhta-Aral Sovkhoz and at the Central Experimental Amelioration Station of the Central Asian Scientific-Research Institute of Irrigation and Amelioration (Zolotaya Orda), showed that during irrigation of cotton plantings by sprinkling, the soil crust and density in the upper horizons of the soils are less formed than with watering along trenches. Sprinkling was conducted with DDA-100 and DM-40 sprinkling units.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

KISELEV, I.I. (Al'met'yevsk, Tatarskaya ASSR); VALIYEV, M.G., inzh.; MICHKOV, N.; YEREMENKO, A.S.; SEMENOV, V.I., inzh.

Readers' letters. Bezop.truda v prom. 6 no.11:35 N '62. (MIRA 16:2)

1. Tuganskoye rudoupravleniye, BASSR (for Valiyev).2. Starshiy inzh. otdela tekhniki bezopasnosti Izhevskogo mashinostroitel'nogo zavoda (for Michkov). 3. Shakhta No. 16 im. "Izvestiy", Luganskaya oblast' (for Yeremenko).

(Industrial safety)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

KOLESNIKOV, N. (TSelinograd); VALIYEV, R. (TSelinograd)

The training place, a collective farm. Voen. znan. 41 no.9:22-23 S '65. (MIRA 18:10)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

The budget and development of the economy of Soviet Bashkiria. Fin. SSSR 17 no.49-52 My '56. (MLRA 9:8)
(Bashkiria--Budget)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

Flourishing of economy and culture of the Bashkir A.S.S.R. Fin. SSSR. 20 no.4:29-32 Ap '59. (MIRA 12:6)

1. Ministr finansov Bashkirskoy ASSR.
(Bashkiria--Economic conditions)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

Improve a budget work. Fin.SSSR 20 no.9:24-28 S '59. (MIRA 12:12)

1. Ministr finansov Bashkirskoy SSR.
(Bashkiria--Budget)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

What must be taken into consideration in the draft law. Fin. SSSR 21 no.6:51-53 Je '60. (MIRA 13:6)

1. Ministr finansov Bashkirskoy ASSR.
(Budget)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

Economic work should be at the center of attention. Fin.SSSR 22 no.6:32-36 Je '61. (MIRA 14:6)

1. Ministr finansov Bashkirskoy ASSR.
(Bashkiria—Finance) (Auditing)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, S.

New features in the interrelationships of the regional economic council and the republic budget of the A.S.S.R. Fin. SSSR 23 no.8:50-52 Ag '62. (MIRA 15:8)

1. Ministr finansov Bashkirskoy ASSR.
(Bashkiria--Finance)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

Z/032/60/010/08/013/033
E073/E535

AUTHOR: Valiyev, S.A., Engineer

TITLE: Deep Drawing with a Negative Clearance

PERIODICAL: Strojírenství, 1960, Vol 10, No 8, pp 598-604

ABSTRACT: The author defines as drawing with a negative clearance the process of deep drawing with a clearance smaller than the thickness of the drawn sheet. The main feature of this type of drawing is that a considerable decrease occurs both in the diameter and the wall thickness of the semi-finished product. The process is diagrammatically represented by the sketches, Figs 3. The classical method of deep drawing without reducing the wall thickness has been investigated by numerous authors, many of whom emphasized the unfavourable influence of "small play" on the process of deep drawing. In this paper the author attempts to prove that this is not the case. The experience of some Soviet works indicates that application of this relatively little studied method of deep drawing leads to an increase in productivity and a saving of material. To obtain concrete

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E073/E535

Deep Drawing with a Negative Clearance

data on this process the author has studied analytically and experimentally the first and second passes of deep drawing with negative clearance. The chemical composition and the mechanical properties of the materials used in the experiments are given in Tables 1 and 2. The geometry and the arrangement of the drawing dies are shown in the sketches, Figs 4 and 5. The test results are described in some detail. A series of photos reproduced in Fig 9 show deep drawn specimens of various materials (brass, steel, stainless steel) with minimum play values (play/original sheet thickness ratios) varying between 0.6 and 0.8. Data are given on the influence of the rounding off radius and on the height of the cylindrical part of the deep drawing die. The experiments comprised over 1000 individual measurements and a number of practical conclusions are derived from these. The experimentally determined minimum tolerances for the first and second passes are entered in Table 4 for Al,

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E073/E535

Deep Drawing with a Negative Clearance

brass, steel and stainless steel. Preliminary calculations have shown that introduction of this method on a production scale will result in a considerable saving in materials (the walls of the deep drawn components will be thinner) and also a reduction in the necessary number of passes by 30 to 50%, whereby the gain will be the larger the larger the height of the deep drawn component. Under certain conditions it will be possible to substitute accurate seamless ~~steel~~ precision pipe by cheaper steel sheet. There are 14 figures, 4 tables and 12 references, 1 of which is Czech, 10 Soviet and 1 German.

ASSOCIATION: Výzkumný ústav mechaniky, Tula (Mechanical Research Institute, Tula, U.S.S.R.)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

Z/032/60/010/011/003/007
E073/E335

AUTHOR: Valiyev, S.A., Engineer

TITLE: Certain Problems of Anisotropy of Deep-drawing Sheet 18

PERIODICAL: Strojírenství, 1960, Vol. 10, No. 11, pp. 842 - 846

TEXT: The aim of the work described in this paper was to determine the extent of the influence of anisotropy of the sheets on the dimensions of deep-drawn cylindrical blanks and to obtain more accurate information on the necessary dimensions of the initial blank required for drawing from anisotropic material. Accurate measurements were made of the wall thicknesses at individual points. On the basis of these and on the basis of studying tears in the material the following conclusions are arrived at. The difference between the wall thickness of a drawn cylindrical component produced by current methods from an anisotropic material cannot be expressed by a linear relation. In the case of a limit degree of forming of anisotropic materials with negative clearance necks form in the top corners and this may give rise

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Z/032/60/010/011/003/007
E073/E335

Certain Problems of Anisotropy of Deep-drawing Sheet

to transverse tears. In the case of drawing anisotropic steels with negative tolerance, the line of tear of the wall has four edges which are shifted by 45° relative to the directions of the original edges. By using an empirically determined coefficient in calculating the diameter of the initial blank, it is possible to reduce the amount of scrap produced from blanks made of anisotropic material. In view of the fact that anisotropy causes a great deal of scrap the author suggests that methods of determining texture should be applied both in metallurgical and fabrication plants. This would provide information for more accurate technological calculations. Two calculation examples are included. There are 1 table, 13 figures and 6 references: 2 German and 4 Soviet.

ASSOCIATION: Tula, USSR

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIEV, S.A. [Valiyev, S.A.]

New materials for drawing dies. Ratsionalizatsiia no.7:23-24 '62.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

S/182/62/000/002/006/006
D038/D112

AUTHOR: Valiyev, S.A.

TITLE: New material for drawing bed dies

PERIODICAL: Kuznechno-shtampovochnoye proizvodstvo, no. 2, 1962, 41-42

TEXT: The author discusses the use of Al bronze alloys for drawing dies for drawing stainless steel shells with closed bottoms. Various alloys of this type were developed by the State Scientific Research Institute of Materials and Technology (Foundry Section) and the Scientific Research Institute of Forging and Pressing Equipment and Technology in Brno, CSR. The composition of two of these alloys is as follows:

| Cu | Al | Ni | Fe | Mn | Cr | Ti |
|---|---|---|---|---|---|---|
| 76.6 | 15.5 | 1.4 | 3.7 | 1.1 | 1.1 | 0.6 |
| 74.7 | 14.9 | 1.3 | 5.2 | 1.1 | 2.6 | 0.2 |

Owing to the extreme brittleness of these alloys, the dies are compressed by a steel retaining ring to avoid tensile strains. The technology for machining the dies is

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

S/182/62/000/002/006/006
D038/D112

New material for drawing bed dies

briefly described. Rape and linseed oil were used as lubricants. When these lubricants were used, it was found that the Al bronze alloy die needed trimming after 3000 cupping operations as compared with a few dozen operations as in the case of steel dies. After 14,000 cupping operations from low-carbon steel blanks, no trimming was required. The shells obtained by the Al bronze dies were of good quality, due to the low friction coefficient and the different nature of the die and blank materials. It is planned to use Al bronze powder for reconditioning worn dies and as a filler for dies made of synthetic resins. Al bronze might be used for making punches for drawing dies, to avoid adhesions and scoring on the internal surfacing of the workpiece. It is stated that the first reports on the use of Al bronze for die equipment appeared in 1955 in the English-language press. There are 3 figures and 3 references; 2 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference is: Dzhons, S.Ts. (Jones, S.Ts.), Sheet Metal Industries, No. 11, 1955.

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, Sadyk [illegible]; [illegible], M.I., red.

[Combined deep drawing of parts with simultaneous reduction of wall thickness] Kombinirovannaia glubokaia vytiazhka detalei s [illegible] stenok. Leningrad, 1965. 24 p. (MIRA 18:10)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, SH.

Karakul Sheep

Elimination of flaws in karakul pelts through feeding factors. Kar. i zver., 5, No. 1, 1952.

Monthly List of Russian Accessions, Library of Congress, June 1952. Unclassified.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, SH.

Feeding and Feeding Stuffs

Elimination of flaws in karakul pelts through feeding factors. Kar. i zver. 5 No. 1, 1952.

Monthly List of Russian Accessions, Library of Congress, June 1952. Unclassified.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEV, Sh.

Valiyev, Sh. "Breeding work on the 'Dargan-Ata' karakul state farm", ( of the Turkmen-karakul' Trust), Karakulevodstvo i zverovodstvo, 1949,No.1, p. 39-41

SO: U-3042, 11 March 53, (Letopis'nykh Statey, No. 10, 1949).

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

FROLOVA, K.; VALIYEV, Z.

One year of operation under the shopless organization of plant management. Mias.ind.SSSR 30 no.2:37 '59. (MIRA 13:4)

1. Kolbasnyy zavod No.3 Moskovskogo myasokombinata.
(Moscow--Sausage)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEVA, D.

Role of the Soviet Red Cross Hospital in Iran in strengthening Soviet-Iranian cultural and scientific relations. Med.zhur.Uzb. no.6:67-72 Je '58. (MIRA 13:6)
(RUSSIA--RELATIONS (GENERAL) WITH IRAN)
(IRAN--RELATIONS (GENERAL) WITH RUSSIA)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

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VALIYEVA, G.A.

VALIEVA, G. A.

22731 Valieva, G. A. Lechenie Trakhomy Ikhtiolom Sbornik Nauch. Trudov Bashkir. Med. Ih-Ta Im. 15-Letiya Vlksm, T. IX, 1949, S. 23-26

So: Letopis', No. 30, 1949

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

YEMEL'YANOV, N.F., prof.; CHELIKANOV, K.N.; LEUS, A.M.; VALIYEVA, S.S.

Ryazan Combine of Artificial Fibers in the light of sanitary hygiene. Nauch.trudy Riaz.med.inst. 23:30-37 '63.
(MIRA 18:12)

1. Kafedra gigiyeny (zav. - kafedroy - prof. N.F.Yemel'yanov) Ryazanskogo meditsinskogo instituta imeni akademika I.P. Pavlova i Ryazanskaya oblastnaya sanitarno-epidemiologicheskaya stantsiya (glavnyy vrach - A.M.Leus).

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8

VALIYEVA, Ye.B.

Combining wet nippers with drying machines. Obm. tekh. opyt. [MLP] no.11:43-46 '56. (MIRA 11:11)
(Drying apparatus--Textile fabrics)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858510005-8"

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VALIYEVA, Z.M.

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SOV/96-59-8-9/27

AUTHORS: Gershteyn, Ye.G., Valk, Ye.G., Syromyatnikov, V.M., Engineers

TITLE: Fault Rates on Standardised High Pressure Boilers

PERIODICAL: Teploenergetika 1959, Nr 8, pp 30-33 (USSR)

ABSTRACT: This article gives a general analysis of boiler fault statistics. The fault rate is defined as the ratio of the number of faults on a group of boilers in a given period to the total operating time of all the boilers in a group, including those without faults, expressed in boiler months. As will be seen from Table 1, there has been a reduction in the fault rate of heating surfaces of Soviet boilers in recent years, while the distribution of faults between the design, erection, operation and repair remains about the same. Tube faults can arise from ash wear or similar causes connected with inadequate adaptation of the boiler to different operating conditions. Latterly such tube faults were classified separately and the figures in Table 2 show that in 1956-57 they accounted for about 30% of all faults. Therefore, at the present time, more than half the faults of heating surfaces are associated with

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Fault Rates on Standardised High Pressure Boilers

manufacturing defects or unsuitability of the design for the operating conditions. Tables 1 and 2 relate to faults that involve boiler shut-down but not to other troubles that were located during normal boiler repair periods. The continuous operating time of boilers is still inadequate: this will be seen from Table 3, where the number of boilers which had no faults on the heating surfaces during the year is expressed as a percentage of the total number of boilers of the type in question. With the introduction of unit-type plant it will be particularly necessary to increase the operating time of boilers. A brief analysis is made of the way in which different types of boilers are affected, first with reference to defects of design and manufacture, and secondly with respect to defects of operation. The data in Table 4 indicate that boilers type TP-230-2 had more faults than other boilers but it should be remembered that most of them work on anthracite dust or other difficult types of fuel. During three or four years operation only a little over half of boilers type TP-230-2 burning anthracite dust escaped shut-down by faults arising from their

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Fault Rates on Standardised High Pressure Boilers

unsuitability for the fuel used. New large boilers are not so highly standardised as those considered in this article, so they should be better adapted to local conditions and more reliable. There are 2 figures and 6 tables.

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